University of Gdańsk

Subject card

Subject name and code	Geoinformation for Physical Oceanography - lecture, PG_00202033						
Field of study	Oceanography						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2026/2027			
Education level	Master's studies		Subject group	Obligatory subject group in the field of study Optional subject group			
Mode of study	full-time studies		Mode of delivery	at the university			
Year of study	1		Language of instruction	Polish			
Semester of study	1		ECTS credits	1.0			
Learning profile	academic		Assessment form	credit			
Conducting unit	Geographic Information System (GIS) Laboratory -> Faculty of Oceanography and Geography -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor	dr Maciej Markowski					
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours	Self-study	SUM	
	Number of study hours	15		1.0	9.0	25	
Subject objectives	The aim of the course is for students to acquire knowledge on the applications of Geographic Information Systems (GIS) in physical oceanography. Students will learn fundamental concepts, data models, and spatial analysis methods used in the study of marine and coastal environments. The course enables understanding of the principles of integrating bathymetric, hydrographic, in situ measurement, and satellite data in the analysis of physical processes in the ocean. As a result, students understand the role of GIS in the interpretation and visualization of phenomena occurring at regional and global scales.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[OCEANMU2-K03] is ready to effectively organize his/her own work, is active and persistent and punctuality in completing tasks, is ready to carrying out evaluation of their own activities	is ready to effectively organize his/her own work on data analysis, is active and persistent and punctual in completing tasks, is ready to evaluate their own activities	[SK4] test/exam - oral or written
[OCEANMU2-W01] knows and understands in-depth specialized terminology used in oceanography and related sciences (in Polish and a selected foreign language)	knows and understands in-depth specialized terminology used in Geographical Information Systems (in Polish and English)	[SW4] test/exam - oral or written
[OCEANMU2-U06] is able to use specialized computer software as well as advanced mathematical and statistical methods to analyze data and describe processes and phenomena occurring in the marine and coastal environment; evaluates their reliability and usefulness and performs critical analysis	is able to use arcGIS Pro to analyse physical processes and phenomena in marine environment and coastal zone	[SU4] test/exam - oral or written
[OCEANMU2-K04] is ready to critically evaluate his/her knowledge and received content in the field of natural sciences in in particular in the field of the studied specialty, a in problematic situations, supports oneself with knowledge experts	is ready to critically evaluate his/her knowledge and information received on applications of Gegraphical Information Systems and in problematic situations seeks an expert support.	[SK4] test/exam - oral or written
[OCEANMU2-W03] has an in-depth understanding of research methods used in oceanography and related sciences, and interprets their mechanisms and interrelationships across different spatial and temporal scales	knows and understands GIS methods used in physical oceanography	[SW4] test/exam - oral or written

Subject contents

1. Geographic Information Systems in Physical Oceanography scope and applications
2. Spatial data, coordinate systems, and map projections in global and regional analyses
3. Spatial data models and digital surface models (terrain and seafloor)
4. Data sources in oceanographic research (in situ measurements, GPS, satellite imagery)
5. Topographic, bathymetric, and hydrographic datasets and metadata
6. Engineering and integration of spatio-temporal data in environmental analyses
7. Georeferencing, transformations, and spatial data quality assessment
8. Vector analysis and modeling of environmental processes in physical oceanography
9. Raster analysis and modeling in physical oceanography
10. Remote sensing in ocean and coastal zone research

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
written test / final	51.0%	100.0%

Recommended reading

Basic literature

- Vasilis D. Valavanis, 2002, Geographic Information Systems in Oceanography and Fisheries. Taylor & Francis CRC Press.
- Davis D., 2004, GIS dla każdego, Wydawnictwo Mikom, Warszawa.
- Gotlib D., Iwaniak A., Olszewski R., 2007. GIS. Obszary zastosowań. PWN Warszawa.
- Urbański J., 2012, GIS w badaniach przyrodniczych (ebook), Centrum GIS, Uniwersytet Gdański.

	Supplementary literature	• Dawn J. Wright, 2015, Ocean Solutions, Earth Solutions, second edition, ESRI Press. • Breman J., 2002, Marine Geography: GIS for the Oceans and Seas. ESRI Press. • Lyon J.G., 2003, GIS for water resources and watershed management, CRC Press. • Tomlinson R., Thinking about GIS, 2013, Esri Press.- Zwoliński Z. (red.), 2010, GIS woda w środowisku. Bogucki Wydawnictwo Naukowe, Poznań. • Markowski M., Golus W., Kwidzińska M., 2015, Aplikacyjność metod oceny wielkości opadów zasilających oczka Pomorza Gdańskiego [w:] D. Absalon, M. Matysik, M. Ruman [red.] Nowoczesne metody i rozwiązania w hydrologii i gospodarce wodnej, Komisja Hydrologiczna Polskiego Towarzystwa Geograficznego, Sosnowiec, s. 287-298.
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. What are the main types of spatial data used in physical oceanography and how are they represented in GIS? 2. How does GIS help in integrating bathymetric, hydrographic, and satellite data for analyzing ocean processes? 3. What is the purpose of georeferencing and map projections in marine and coastal spatial analyses?	
Work placement	Not applicable	

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